

TECHNICAL MEMORANDUM

DATE: September 23, 2011

TO: Mr. Carl Warren, WAM, EPA Region 9

FROM: Scott Ruth, Project Manager, Bristol Environmental Remediation Services, LLC

RE: EPA Contract No. EP-W-07-104
Work Assignment LS-003, LUST Site Assessments in Indian Country
Bond & Bond/NAV 046

Bristol Environmental Remediation Services, LLC (Bristol), has prepared this Technical Memorandum (Tech Memo) at the request of the U.S. Environmental Protection Agency (EPA). The Tech Memo provides the following information for the subject site, Bond & Bond (EPA ID NAV 046), located in Shiprock, New Mexico:

- Results of the August 2011 groundwater sampling event, including water levels and analytical results
- Installation of five oxygen emitters

EXECUTIVE SUMMARY

The Bond & Bond site is located on the north side of U.S. Highway 64 in Shiprock, New Mexico, approximately one-quarter mile southwest of the intersection of U.S Highways 64 and 491. Bond & Bond is no longer operating at the site, and the former Bond & Bond building is occupied by a hardware store and a video rental store.

Three underground storage tanks (USTs) were removed from the site in 1993. Evidence of a petroleum release was noted at the time of UST removal. Nine monitoring wells were installed between 1993 and 2005. Four of the original nine monitoring wells cannot be located.

The EPA assigned this site to Bristol under Work Assignment LS-003, Contract Number EP-W-07-104. In 2008, Bristol installed 11 additional monitoring wells at the site and characterized the extent of soil and groundwater contamination.

Exceedances of cleanup levels in soil include gasoline range organics (GRO), diesel range organics (DRO), and benzene. Exceedances of cleanup levels in groundwater include GRO and DRO. Sixteen monitoring wells have been installed on the site. Non-aqueous phase liquid (NAPL) was measured in two wells (MW-1 and MW-10), up to a thickness of 0.66 feet. The direction of groundwater flow is to the west.

Attachment 1 to this Tech Memo includes Tables 1 and 2, which present water levels and groundwater analytical results. Attachment 2 includes Figures 1 through 6, which show the site layout, groundwater contours, selected analytical results, and distribution of selected, individual contaminants.

SITE BACKGROUND

The Bond & Bond site is located in Shiprock, New Mexico, approximately one-quarter mile west of the junction of U.S. Highway 491, along U.S. Highway 64 (Attachment 2, Figure 1). The highway is an area of heavy traffic use. With a population of approximately 8,000, Shiprock is one of the more populated towns on the Navajo Nation. The area around the site is used for commercial and residential purposes. An operating hardware store and a video rental store are located on the site (Attachment 2, Figure 2). A trailer home is located west of the site. A Bureau of Indian Affairs facility is located north of the site. Potential receptors include on-site or nearby commercial or residential buildings and the San Juan River. Activities that have been conducted at the site include the following:

- 1993 – Three USTs were removed and a petroleum release confirmed. Eight monitoring wells were installed. Soil contamination was identified, but none of the monitoring wells were found to contain groundwater contamination.
- June 2003 – A full round of groundwater sampling was conducted. Only seven of the original eight wells were located, and only four were found to contain groundwater. None of the four monitoring wells sampled were found to contain groundwater contamination above EPA maximum contaminant levels (MCLs).

- 2005 – One additional monitoring well (MW-7) was installed and a full round of groundwater sampling was conducted. One monitoring well (MW-1) was found to contain NAPL and another (MW-5) was found to be dry. Newly installed MW-7 was found to contain ethylbenzene above the EPA MCL.
- May 2008 – A full round of groundwater sampling was conducted.
- August 2008 – Seventeen soil borings were installed, nine of which were completed as monitoring wells MW-8 through MW-16.
- September 2008 – All nine newly installed monitoring wells (MW-8 through MW-16) were sampled.
- November 2008 – Six soil borings were installed, two of which were completed as monitoring wells MW-17 and MW-18.
- December 2008 – A full round of groundwater sampling was conducted.
- June 2009 – A full round of groundwater sampling was conducted.
- April 2010 – A full round of groundwater sampling was conducted.
- July 2010 – Trench excavation and used oil tank test pit excavation and soil sampling was conducted.
- December 2010 – A full round of groundwater sampling was conducted.
- August 2011 – A full round of groundwater sampling was conducted. Analytical results and water level measurements are presented in attached tables (Attachment 1) and figures (Attachment 2).

GENERAL SITE CONDITIONS

The site has been characterized and found to have petroleum contamination at concentrations exceeding cleanup levels for both soil and groundwater. NAPL has historically been detected in wells MW-1 and MW-10. Contaminants detected at the site include volatile organic compounds (VOCs), GRO, and DRO.

COMPLETED TASKS

In August 2011, a full round of groundwater sampling was conducted at the Bond & Bond site for ongoing monitoring purposes. MW-5 and MW-12 were found to be dry and therefore were not sampled. Two monitoring wells contained NAPL (MW-1 and MW-10), and also were not sampled. MW-16 was found to be destroyed during the previous sampling event (December 2011) and therefore was not sampled.

All 11 of the other monitoring wells at the site were sampled, and water levels were measured. Groundwater samples were submitted for laboratory analysis to TestAmerica Laboratories, Inc. Samples were analyzed for GRO, DRO, and oil range organics using EPA Method 8015D, and for VOCs (including 1,2-Dibromoethane [EDB]) using EPA8260B. Groundwater samples were found to exceed cleanup levels for DRO in wells MW-7, MW-8, MW-9, MW-11, and MW-15. MW-9 was the only well that had GRO concentration exceeding the cleanup level. Groundwater analytical results are presented in Attachment 2, Table 2. Figure 3 presents the groundwater elevation data and contours for the August sampling event. Figures 4, 5, and 6 present the groundwater analytical results.

During the week of August 22, Bristol installed oxygen emitters in monitoring wells MW-1 and MW-10. During the week of September 19, Bristol installed oxygen emitters in monitoring wells MW-7, MW-8, and MW-9. In each of these five monitoring wells, one Waterloo Emitter™ (emitter), Model 703, was suspended in the water column. Tubing from each emitter was buried and run to a partially-buried, lockable metal box located on the east end of the video store. Inside the box, each piece of tubing was connected to a canister containing oxygen. The emitters are designed for the controlled and uniform release of oxygen into the groundwater to encourage and sustain the growth of microorganisms required for in-situ bioremediation of petroleum-contaminated groundwater. The design of the emitter enables a steady, direct diffusion of oxygen into the aquifer through pressurized silicone tubing that is coiled around the outside of the emitter's polyvinyl chloride frame. Continuous, consistent release of oxygen into the silicon tubing creates a concentration gradient that drives this passive system.

PLANNED OR PROPOSED ACTIVITIES

Based on discussion among the EPA, Bristol, and Navajo Nation Environmental Protection Agency (NNEPA), the following activities were discussed for implementation in 2011.

CONCEPTUAL SITE MODEL

Based on the data and information during the site characterization activities, petroleum-hydrocarbon contamination remains above established NNEPA screening levels at the site. The media of concern and potential exposure pathways and receptors for the site are described in the following sections.

SURFACE SOIL

Based on physical observations of the site surface soil and soil boring data, petroleum-hydrocarbon contamination does not appear to be present in the surface soil; therefore, surface soil does not pose a risk to current and future potential receptors.

SUBSURFACE SOIL

Subsurface soil analytical results from the site characterization soil borings indicate that petroleum-hydrocarbon contamination exists at the site at concentrations above NNEPA screening levels.

Contaminated soil is present in a zone at the groundwater table. The contamination present is primarily DRO and GRO. Benzene was detected in one soil sample from MW-10 at a concentration of 0.47 milligrams per kilogram (mg/kg), which is greater than the NNEPA screening level of 0.13 mg/kg, but less than the EPA regional screening level of 1.1 mg/kg.

While petroleum hydrocarbons remain in subsurface soils at the site, the contamination is present at depths where exposure to future potential receptors is limited and unlikely. The most likely exposure would be to construction workers at the site. Vapor intrusion into future buildings constructed on site is not likely, given the depth of the remaining contamination and lack of large quantities of volatile compounds.

GROUNDWATER

Groundwater sampling results for monitoring wells on the site show that VOCs are not present at levels above MCLs. Diesel range organics and GRO are present in groundwater at the site.

NAPL has been found in two wells at the site (MW-1 and MW-10). This NAPL is not likely to be mobile. Vapor intrusion into future buildings constructed on site is not likely, given the lack of VOCs and the depth to groundwater. Water is supplied to all the buildings on the site by a public water supply, and groundwater on site is not used.

SURFACE WATER

Based on the site characterization data, migration of contaminants to surface water (San Juan River) has not occurred.

RISK ASSESSMENT

Based on the site characterization data and groundwater monitoring data, it is recommended that a human health risk assessment be performed to evaluate the need for further remedial action at the site.

2012 Groundwater Sampling

Groundwater sampling occurred only once during 2011 (in August). The need for future groundwater sampling at the site will be evaluated following the risk assessment.

Operation of the Oxygen Emitters

The oxygen tanks should be checked for remaining oxygen in late 2011/early 2012 and replenished if necessary.

Schedule Summary

Activity	Month/Year	Tentative Start Date
Risk Assessment	To be determined	To be determined
Checking/refilling oxygen containers	To be determined	To be determined

ATTACHMENT 1

Tables

Table 1 Static Water Level Measurements for Bond & Bond (NAV 046)

Table 2 Current and Historical Groundwater Analytical Results

**Table 1 Static Water Level Measurements for
Bond & Bond (NAV 046)**

Well Name	TOC Elevation (feet above MSL)	Measurement Date	Depth to NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)	SWL Elevation (feet above MSL)
MW-1	4896.26	6/16/2003	--	11.35	--	4884.91
		5/21/2008	NR	10.78	NR	4885.48
		9/2/2008	--	10.39	--	4885.87
		12/5/2008	12.15	12.18	0.03	4884.10*
		6/17/2009	--	11.34	--	4884.92
		4/7/2010	--	11.58	--	4884.68
		12/8/2010	12.08	12.24	0.16	4884.15*
		8/10/2011	12.48	13.14	0.66	4883.65*
MW-4	4895.95	6/16/2003	--	10.96	--	4884.99
		5/21/2008	--	10.39	--	4885.56
		9/2/2008	--	11.81	--	4884.14
		12/5/2008	--	11.80	--	4884.15
		6/17/2009	--	11.03	--	4884.92
		4/7/2010	--	11.28	--	4884.67
		12/8/2010	--	11.78	--	4884.17
		8/10/2011	--	12.25	--	4883.70
MW-5	4894.46	6/16/2003	--	11.90	--	4882.56
		9/2/2008	--	10.35	--	4884.11
		12/5/2008	--	10.04	--	4884.42
		6/17/2009	--	--	--	--
		4/7/2010	--	DRY	--	--
		12/8/2010	--	DRY	--	--
MW-6	4895.15	8/10/2011	--	DRY	--	--
		6/16/2008	--	10.63	--	4884.52
		5/21/2008	--	9.93	--	4885.22
		9/2/2008	--	11.32	--	4883.83
		12/5/2008	--	11.35	--	4883.80
		6/17/2009	--	10.53	--	4884.62
		4/7/2010	--	10.87	--	4884.28
MW-7	4896.21	12/8/2010	--	11.32	--	4883.83
		8/10/2011	--	11.78	--	4883.37
		5/21/2008	--	10.81	--	4885.40
		9/2/2008	--	13.22	--	4882.99
		12/5/2008	--	12.15	--	4884.06
		6/17/2009	--	11.37	--	4884.84
		4/7/2010	--	11.61	--	4884.60
MW-8	4895.26	12/8/2010	--	12.13	--	4884.08
		8/10/2011	--	12.62	--	4883.59
		9/2/2008	--	11.27	--	4883.99
		12/5/2008	--	11.23	--	4884.03
		6/17/2009	--	10.43	--	4884.83
		4/7/2010	--	10.65	--	4884.61
MW-8	4895.26	12/8/2010	--	11.19	--	4884.07
		8/10/2011	--	11.68	--	4883.58

**Table 1 Static Water Level Measurements for
Bond & Bond (NAV 046) (continued)**

Well Name	TOC Elevation (feet above MSL)	Measurement Date	Depth to NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)	SWL Elevation (feet above MSL)
MW-9	4895.85	9/2/2008	--	11.98	--	4883.87
		12/5/2008	--	11.90	--	4883.95
		6/17/2009	--	11.05	--	4884.80
		4/7/2010	--	11.34	--	4884.51
		12/8/2010	--	11.82	--	4884.03
		8/10/2011	--	12.29	--	4883.56
MW-10	4895.22	9/2/2008	--	11.24	--	4883.98
		12/5/2008	--	11.27	--	4883.95
		6/17/2009	--	10.46	--	4884.76
		4/7/2010	--	10.74	--	4884.48
		12/8/2010	11.21	11.33	0.12	4883.99*
		8/10/2011	11.67	11.76	0.09	4883.53*
MW-11	4891.59	9/2/2008	--	7.85	--	4883.74
		12/5/2008	--	7.82	--	4883.77
		6/17/2009	--	7.05	--	4884.54
		4/7/2010	--	7.27	--	4884.32
		12/8/2010	--	7.80	--	4883.79
		8/10/2011	--	8.31	--	4883.28
MW-12	4896.17	9/2/2008	--	11.96	--	4884.21
		12/5/2008	--	11.92	--	4884.25
		6/17/2009	--	11.16	--	4885.01
		4/7/2010	--	11.34	--	4884.83
		12/8/2010	--	11.90	--	4884.27
		8/10/2011	--	DRY	--	--
MW-13	4895.65	9/2/2008	--	11.28	--	4884.37
		12/5/2008	--	11.33	--	4884.32
		6/17/2009	--	10.60	--	4885.05
		4/7/2010	--	10.83	--	4884.82
		12/8/2010	--	11.37	--	4884.28
		8/10/2011	--	11.88	--	4883.77
MW-14	4892.09	9/2/2008	--	8.02	--	4884.07
		12/5/2008	--	8.03	--	4884.06
		6/17/2009	--	7.22	--	4884.87
		4/7/2010	--	7.42	--	4884.67
		12/8/2010	--	7.96	--	4884.13
		8/10/2011	--	8.47	--	4883.62
MW-15	4892.76	9/2/2008	--	8.73	--	4884.03
		12/5/2008	--	8.73	--	4884.03
		6/17/2009	--	7.96	--	4884.80
		4/7/2010	--	8.16	--	4884.60
		12/8/2010	--	8.71	--	4884.05
		8/10/2011	--	9.21	--	4883.55
MW-16	4892.71	9/2/2008	--	8.75	--	4883.96
		12/5/2008	--	8.77	--	4883.94
		6/17/2009	--	7.96	--	4884.75
		4/7/2010	--	DRY	--	--
		12/8/2010	Well Destroyed			
		8/10/2011				

**Table 1 Static Water Level Measurements for
Bond & Bond (NAV 046) (continued)**

Well Name	TOC Elevation (feet above MSL)	Measurement Date	Depth to NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)	SWL Elevation (feet above MSL)
MW-17	4895.15	12/5/2008	--	11.12	--	4884.03
		6/17/2009	--	10.29	--	4884.86
		4/7/2010	--	10.63	--	4884.52
		12/8/2010	--	11.07	--	4884.08
		8/10/2011	--	11.49	--	4883.66
MW-18	4892.66	12/5/2008	--	8.66	--	4884.00
		6/17/2009	--	7.86	--	4884.80
		4/7/2010	--	8.06	--	4884.60
		12/8/2010	--	8.62	--	4884.04
		8/10/2011	--	9.14	--	4883.52

Notes:

-- = not applicable (NAPL not present in well)

SWL = static water level

* = SWL elevation corrected for NAPL using a factor of 0.8

MSL = mean sea level

NAPL = non-aqueous phase liquid

NR = not recorded

Table 2 Current and Historical Groundwater Analytical Results

Location	Sample Identification	Sample Date	GRO	DRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	EDB	MTBE	Lead	
			(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
			Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
NNEPA MCL ¹			304*	328*	5	1,000	700	10,000	0.05	12**	0.015	
MW-1	MW-1	6/16/2003	--	--	ND	ND (1.0)	ND (1.0)	ND	ND (1.0)	ND (1.0)	--	
		8/12/2005	Not Sampled, NAPL Present									
		5/21/2008										
		12/5/2008										
		6/17/2009	320 J	150,000 J	ND (5.0)	18	ND (5.0)	ND (5.0)	ND (0.02)	ND (5.0)	--	
		4/7/2010	1,200 J	700,000 J	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.01966)	ND (0.50)	--	
		12/9/2010	Not Sampled, NAPL Present									
		8/10/2011										
MW-4	MW-4	6/16/2003	--	--	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	--	
		8/15/2005	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	--	ND (1.0)	ND (0.010)	
		5/21/2008	ND (200)	ND (110) UJL	ND (0.50)	ND (0.50)	ND (0.50)	32.1	ND (0.0199)	ND (2.0)	ND (0.010)	
		12/5/2008	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0096)	ND (2.0)	--	
		6/17/2009	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (0.50)	ND (1.0)	ND (0.02)	ND (0.50)	--	
		4/7/2010	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.01989)	ND (0.50)	--	
		12/9/2010	ND (200)	ND (100) UJ	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.019)	ND (0.50)	--	
		8/10/2011	ND (200)	ND (100)	ND (0.50) UJL	ND (0.50) UJL	ND (0.50) UJL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--	
MW-5	MW-5	6/16/2003	--	--	ND (1.0)	ND (1.0)	1.74	1.9	ND (1.0)	ND (1.0)	--	
		8/15/2005	Not Sampled, Well Dry									
		5/21/2008										
		12/5/2008										
		6/17/2009										
		4/7/2010										
		12/9/2010										
		8/10/2011										
MW-6	MW-6	6/16/2003	--	--	1.38	ND (1.0)	1.86	ND (1.0)	ND (1.0)	ND (1.0)	--	
		8/15/2005	--	--	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	--	ND (1.0)	ND (0.010)	
		5/21/2008	ND (200)	220 JL	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.5)	ND (0.0199)	ND (2.0)	ND (0.010)	
		12/5/2008	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0095)	ND (2.0)	--	
		6/17/2009	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (0.50)	ND (1.0)	ND (0.02)	ND (0.50)	--	
		4/7/2010	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.001961)	ND (0.50)	--	
		12/9/2010	ND (200)	150 JH	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.50)	ND (0.50)	--	
	MW-20 DUP [†]	12/9/2010	ND (200)	ND (120) J	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.020)	ND (0.50)	--	
	MW-6	8/10/2011	ND (200)	ND (110)	ND (0.50) UJL	ND (0.50) UJL	ND (0.50) UJL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--	

Table 2 Current and Historical Groundwater Analytical Results (continued)

Location	Sample Identification	Sample Date	GRO	DRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	EDB	MTBE	Lead	
			(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
			Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
NNEPA MCL ¹			304*	328*	5	1,000	700	10,000	0.05	12**	0.015	
MW-7	MW-7	8/15/2005	--	--	3.3	3.5	1,120	675.6	--	2.8	ND (0.010)	
		5/21/2008	1,900	1,100 JL	1.2	3.2	130	6.5	ND (0.0201)	ND (2.0)	ND (0.010)	
	MW-7 DUP [†]	5/21/2008	2,100	840 JL	1.1	3.3	110	5.8	ND (0.0199)	ND (2.0)	ND (0.010)	
	MW-7	12/5/2008	280 J	ND (100)	ND (0.50)	ND (2.0)	21	ND (3.0)	ND (0.0096)	ND (2.0)	--	
		6/17/2009	3,200 JH	2,900 J	ND (0.50)	ND (0.50) UJL	16 JL	1	ND (0.02)	ND (0.50)	--	
		4/7/2010	1,200 JH	1,300 J	ND (0.50)	ND (0.50)	8.1 J	ND (1.0)	ND (0.01994)	ND (0.50)	--	
	MW-20 [†]	4/7/2010	2,100 JH	1,600 J	ND (0.50)	ND (0.50)	3.4 J	ND (1.0)	ND (0.02096)	ND (0.50)	--	
	MW-7	12/9/2010	ND (200)	440 J	ND (0.50)	ND (0.50)	2.9 J	ND (1.0)	ND (0.020)	ND (0.50)	--	
	MW-21 [†]	12/9/2010	ND (200)	740 JL	ND (0.50)	ND (0.50)	2.1 J	ND (1.0)	ND (0.020)	ND (0.50)	--	
	MW-7	8/10/2011	210	1,100 J	ND (0.50) UJL	ND (0.50) UJL	0.99 JL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--	
MW-21 [†]	8/10/2011	ND (200)	1,500 J	ND (0.50) UJL	ND (0.50) UJL	0.71 JL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--		
MW-8	MW-8	9/2/2008	1,000 JH	19,000 JL	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0209)	ND (2.0)	ND (0.010)	
		12/5/2008	ND (200)	5,300 J	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0096)	ND (2.0)	--	
		6/17/2009	420 JL	7,400 J	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.02)	ND (0.50)	--	
		4/7/2010	330 J	8,800 J	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.01994)	ND (0.50)	--	
		12/8/2010	ND (200)	1,200 J	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.020)	ND (0.50)	--	
		8/10/2011	ND (200)	2,100	ND (0.50) UJL	ND (0.50) UJL	ND (0.50) UJL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--	
MW-9	MW-9	9/2/2008	2,800 JH	850 JL	ND (5.0)	ND (20)	250	85	ND (0.0200)	ND (20)	ND (0.010)	
		12/5/2008	1,100 J	350 J	ND (0.50)	ND (2.0)	92	8.4	ND (0.0096)	ND (2.0)	--	
		6/17/2009	1,200 JH	1,600 J	ND (5.0)	ND (5.0)	81 J	11	ND (0.02)	ND (5.0)	--	
		4/7/2010	1,000 JH	310 J	ND (0.50)	ND (0.50)	14 J	3.9	ND (0.01961)	ND (0.50)	--	
		12/9/2010	900 JH	910 J	ND (0.50)	ND (0.50)	18 J	3.1	ND (0.019)	ND (0.50)	--	
		8/10/2011	320	1,500	ND (0.50) UJL	ND (0.50) UJL	11 JL	1.9 JL	ND (0.50) UJL	ND (0.50) UJL	--	
	MW-20 [†]	8/10/2011	350	1,300	ND (0.50) UJL	ND (0.50) UJL	10 JL	1.9 JL	ND (0.50) UJL	ND (0.50) UJL	--	
MW-10	MW-10	9/2/2008	4,900 JH	400 JL	ND (0.50)	ND (2.0)	5.3	ND (3.0)	ND (0.0205)	ND (2.0)	ND (0.010)	
		12/5/2008	400 J	120 J	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0095)	ND (2.0)	--	
	MW-21 [†]	12/5/2008	1,200 J	200 J	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0100)	ND (2.0)	--	
	MW-10	6/17/2009	7,000 JH	66,000 J	ND (5.0)	ND (5.0)	13 J	ND (10)	ND (0.02)	ND (5.0)	--	
		4/7/2010	5,100 JH	80,000 J	ND (0.50)	ND (0.50)	5.1 J	ND (1.0)	ND (0.01977)	ND (0.50)	--	
	MW-21 [†]	4/7/2010	7,900 JH	29,000 J	ND (0.50)	ND (0.50)	7.4 J	ND (1.0)	ND (0.01983)	ND (0.50)	--	
	MW-10	12/9/2010	Not Sampled, NAPL Present									
		8/10/2011										

Table 2 Current and Historical Groundwater Analytical Results (continued)

Location	Sample Identification	Sample Date	GRO	DRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	EDB	MTBE	Lead	
			(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
			Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
NNEPA MCL ¹			304*	328*	5	1,000	700	10,000	0.05	12**	0.015	
MW-11	MW-11	9/2/2008	ND (200)	150 JL	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0203)	ND (2.0)	ND (0.010)	
		12/5/2008	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0096)	ND (2.0)	--	
		6/17/2009	ND (200)	190 J	ND (0.50)	ND (2.0)	ND (0.50)	ND (1.0)	ND (0.02)	ND (5.0)	--	
		4/7/2010	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.001961)	ND (0.50)	--	
		12/8/2010	ND (200)	ND (100) UJL	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.020)	ND (0.50)	--	
		8/10/2011	ND (200)	160	ND (0.50) UJL	ND (0.50) UJL	ND (0.50) UJL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--	
MW-12	MW-12	9/2/2008	ND (200)	ND UJL	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0201)	ND (2.0)	ND (0.010)	
		12/5/2008	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0096)	ND (2.0)	--	
		6/17/2009	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.02)	ND (5.0)	--	
		4/7/2010	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.01977)	ND (0.50)	--	
		12/8/2010	ND (200)	ND (100) UJL	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.020)	ND (0.50)	--	
		8/10/2011	Not Sampled, Well Dry									
MW-13	MW-13	9/2/2008	ND (200)	ND UJL	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0200)	ND (2.0)	ND (0.010)	
		12/5/2008	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0097)	ND (2.0)	--	
		6/17/2009	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.02)	ND (5.0)	--	
		4/7/2010	ND (200)	130 J	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.01966)	ND (0.50)	--	
		12/8/2010	ND (200)	ND (100) UJL	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.020)	ND (0.50)	--	
		8/10/2011	ND (200)	ND (100)	ND (0.50) UJL	ND (0.50) UJL	ND (0.50) UJL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--	
MW-14	MW-14	9/2/2008	ND (200)	180 JL	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0203)	ND (2.0)	ND (0.010)	
		12/5/2008	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0095)	ND (2.0)	--	
	MW-14	MW-22 [†]	12/5/2008	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0096)	ND (2.0)	--
		MW-14	6/17/2009	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.02)	ND (5.0)	--
			4/7/2010	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.01972)	ND (0.50)	--
			12/8/2010	ND (200)	ND (100) UJL	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.020)	ND (0.50)	--
			8/10/2011	ND (200)	ND (100)	ND (0.50) UJL	ND (0.50) UJL	ND (0.50) UJL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--
MW-15	MW-15	9/2/2008	ND (200)	5,700 JL	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0206)	ND (2.0)	ND (0.010)	
		12/5/2008	ND (200)	850 J	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0096)	ND (2.0)	--	
		6/17/2009	ND (200)	770 J	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.02)	ND (5.0)	--	
		4/7/2010	ND (200)	2,200 J	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.01994)	ND (0.50)	--	
		12/8/2010	ND (200)	390 JL	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.020)	ND (0.50)	--	
		8/10/2011	ND (200)	600	ND (0.50) UJL	ND (0.50) UJL	ND (0.50) UJL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--	
MW-16	MW-16	9/2/2008	ND (200)	340 JL	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0208)	ND (2.0)	ND (0.010)	
		12/5/2008	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0096)	ND (2.0)	--	
		6/17/2009	ND (200)	120 J	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.02)	ND (5.0)	--	
		4/7/2010	Not Sampled, Well Dry									
		12/8/2010	Not Sampled, Well Destroyed									
		8/10/2011										

Table 2 Current and Historical Groundwater Analytical Results (continued)

Location	Sample Identification	Sample Date	GRO	DRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	EDB	MTBE	Lead	
			(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
			Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
NNEPA MCL ¹			304*	328*	5	1,000	700	10,000	0.05	12**	0.015	
MW-17	MW-17	12/5/2008	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0096)	ND (2.0)	--	
		6/17/2009	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.02)	ND (5.0)	--	
		4/7/2010	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.01983)	ND (0.50)	--	
		12/9/2010	ND (200)	ND (100) UJL	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.020)	ND (0.50)	--	
		8/10/2011	ND (200)	ND (100)	ND (0.50) UJL	ND (0.50) UJL	ND (0.50) UJL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--	
MW-18	B-19-W	11/17/2008	--	150	--	--	--	--	--	--	--	
	MW-18	12/5/2008	ND (200)	ND (100)	ND (0.50)	ND (2.0)	ND (2.0)	ND (3.0)	ND (0.0095)	ND (2.0)	--	
		6/17/2009	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.02)	ND (5.0)	--	
		4/7/2010	ND (200)	ND (100)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.01994)	ND (0.50)	--	
		12/8/2010	ND (200)	ND (100) UJL	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.020)	ND (0.50)	--	
		8/10/2011	ND (200)	ND (100)	ND (0.50) UJL	ND (0.50) UJL	ND (0.50) UJL	ND (1.5) UJL	ND (0.50) UJL	ND (0.50) UJL	--	

Notes:

Bold values exceed MCLs.

¹Safe Drinking Water Act. The NNEPA uses the MCLs established by the EPA.

-- = not analyzed

* = NNEPA has not established MCL for DRO or GRO. The associated values are cleanup levels proposed by EPA Region 9.

** = NNEPA has not established MCL for MTBE. The associated value is an EPA RSL.

[†] = indicates duplicate sample

µg/L = micrograms per liter

DRO = diesel range organics

EDB = 1,2-Dibromoethane

EPA = U.S. Environmental Protection Agency

GRO = gasoline range organics

MCL = maximum contaminant level

mg/L = milligrams per liter

MTBE = methyl tert-butyl ether

NAPL = non-aqueous phase liquid

ND = not detected

NNEPA = Navajo Nation Environmental Protection Agency

RSL = regional screening level

Data Flags:

J = the associated value is an estimated quantity

JH = the associated value is an estimated quantity with a potential high bias

JL = the associated value is an estimated quantity with a potential low bias

UJ = the associated value is an estimated non-detect

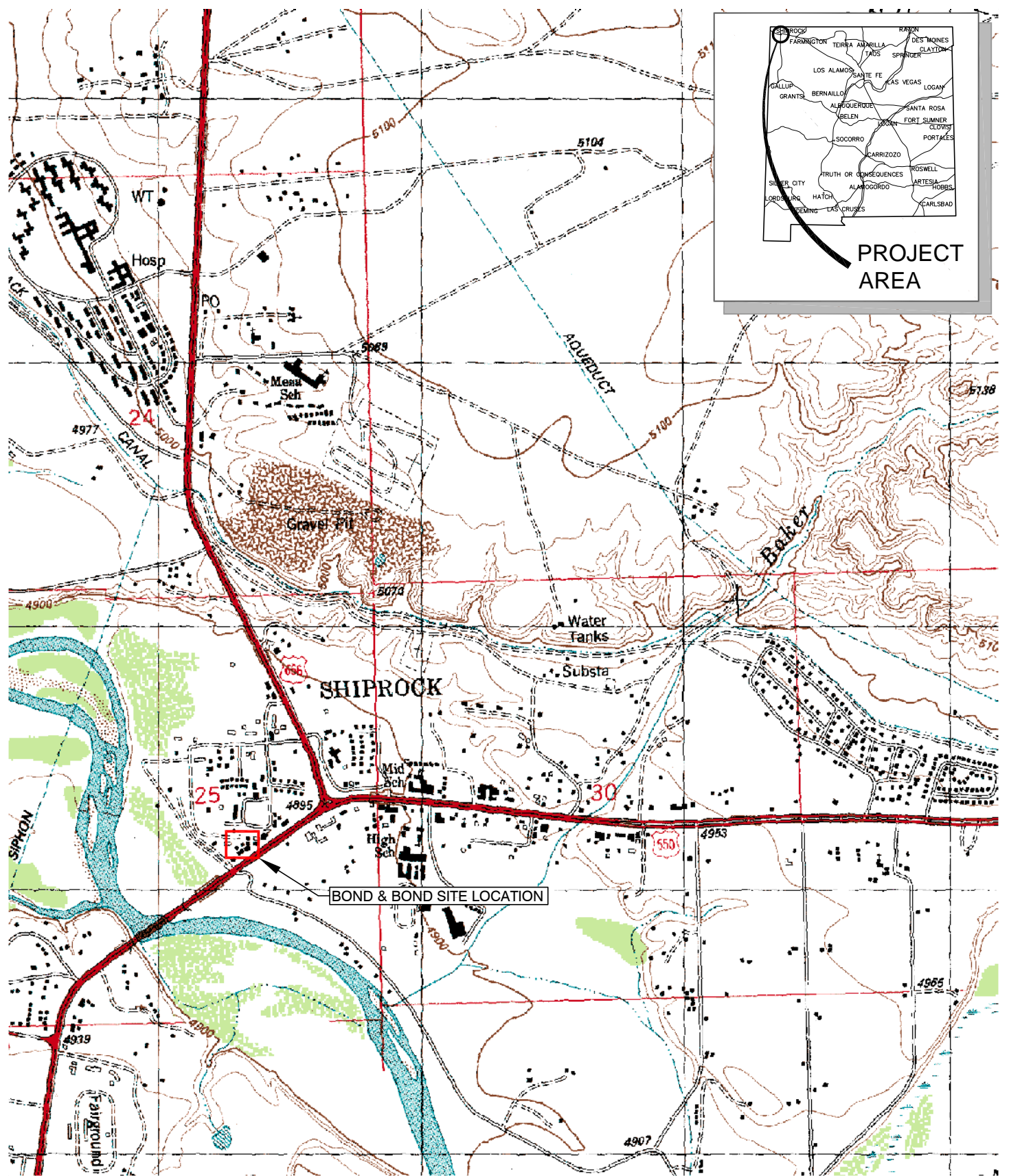
UJL = the associated value is an estimated non-detect with a potential low bias

ATTACHMENT 2

Figures

- | | |
|----------|--|
| Figure 1 | Site Location |
| Figure 2 | Site Map |
| Figure 3 | August 2011 Groundwater Elevations and Contours |
| Figure 4 | August 2011 Groundwater Analytical Results |
| Figure 5 | Extent of GRO in Groundwater Exceeding Cleanup Level |
| Figure 6 | Extent of DRO in Groundwater Exceeding Cleanup Level |

Drawing: O:\JOBS\411042 EPA 1013 3-HOP\ACAD-ENVIRO\FIGURES-BOND&BOND-SEPT2011\411042-FIG1-SEPT2011.DWG - Layout: 411042-FIG1-SEPT2011
 User: MGARCIA Sep 23, 2011 - 11:39am Xrefs: - Images: 47285631.TIF SHIPROCK_NM_COLLARLESS_24K.TIF



TOPO REFERENCE
 Coolidge Dam (AZ) Topo Quad
 Orig Date: 1991
 Quad series: 7.5'
 Paper source: Topographic 1:24,000

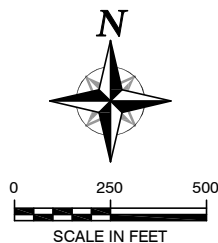
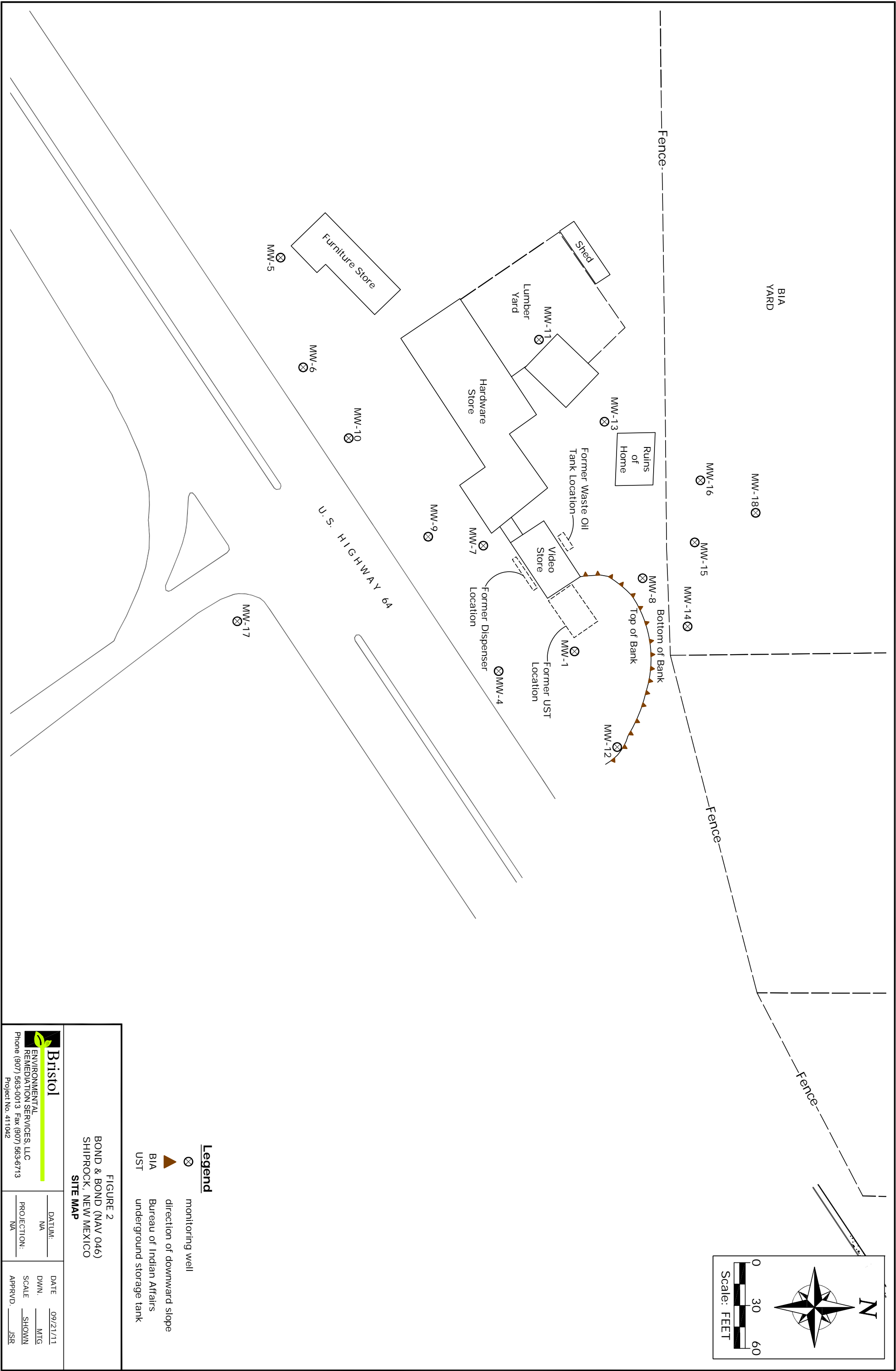


FIGURE 1
 BOND & BOND (NAV 046)
 SHIPROCK, NEW MEXICO
 SITE LOCATION

Bristol
 ENVIRONMENTAL
 REMEDIATION SERVICES, LLC
 Phone (907) 563-0013 Fax (907) 563-6713
 Project No. 411042

DATUM:	NA	DATE	09/21/11
PROJECTION:	NA	DWN.	MTG
		SCALE	SHOWN
		APPRVD.	JSR



Bristol ENVIRONMENTAL REMEDIALATION SERVICES, LLC Phone (907) 563-0013 Fax (907) 563-6713 Project No. 411042		DATE: 09/21/11 DWN. MTG SCALE SHOWN APPRVD. JSR	
BOND & BOND (NAV 046) SHIPROCK, NEW MEXICO SITE MAP		DATUM: NA PROJECTION: NA	

